PROJECT FACT SHEET

CONTRACT TITLE: West Hackberry Tertiary Project -- Class I

ID NUMBER: DE-FC22-93BC14963

B&R CODE: AC1010000

CONTRACTOR: Amoco Exploration and Production Co.

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PROJECT SITE
CITY: W. Hackberry Field **STATE:** LA
CITY: Cameron Parish **STATE:** LA
CITY: **STATE:**

CONTRACT PERFORMANCE PERIOD:
9/3/1993 to 7/2/2002

PROGRAM: Field Demonstration
RESEARCH AREA: Class 1
PRODUCT LINE: RLE

FUNDING (1000'S)	DOE	CONTRACTOR	TOTAL
PRIOR FISCAL YRS	9975	9976	19951
FISCAL YR 1999	0	0	0
FUTURE FUNDS	0	0	0
TOTAL EST'D FUNDS	9975	9976	19951

OBJECTIVE: Amoco and the DOE are field testing the concept that air injection can be combined with the double displacement process (gas displacement of a water-invaded oil column to generate tertiary oil recovery through gravity drainage) to create a new EOR process for light oil reservoirs that would be profitable in today's economic environment. Although other gasses such as nitrogen or carbon dioxide can be combined with the double displacement process, air is lower cost and universally accessible even in remote or environmentally sensitive areas.

Dec 1999

PROJECT DESCRIPTION:

Background: In fluvial-dominated deltaic reservoirs, miscible gas floods (involving CO2) are considered the strongest candidates for generating tertiary oil recovery. Few CO2 floods have been attempted in these reservoirs due to the poor accessibility and high cost of CO2. In steeply dipping West Hackberry oil reservoirs, gravity drainage recovers 80% - 90% of the OOIP while waterdrive recovers 50% - 60% of the original oil in place. By injecting air into a watered out or low pressure reservoir with a thin oil rim, a gas cap can be created or expanded to allow gravity drainage to occur thereby generating recoveries similar to miscible floods. Additionally, air injection combines excellent accessibility with low cost. The limiting factors to this process are the need for sufficient reservoir temperature for spontaneous combustion and sufficient bed dip for gravity drainage. Spontaneous combustion is required to prevent problems associated with oxygen breakthrough to producing wells.

Work to be Performed: Amoco will use the double displacement process (gas displacement of a water-invaded oil column) to produce remaining oil by gravity drainage in the Camerina and Bol-3 sands in the West Hackberry Field, Cameron Parish, Louisiana. These reservoirs are found on the flank of a Gulf Coast salt dome. The producibility problem to be overcome by the proposed technology is the recovery of residual oil left by the natural water influx. The project is targeted at both higher pressure reservoirs that have watered out and low pressure reservoirs that possess a gas cap and thin oil rim. Air is injected in the higher pressure reservoirs to create a gas cap thereby creating an environment for enhanced recovery through gravity drainage. In the low pressure reservoirs, air injection expands the gas cap for enhanced recovery through gravity drainage and also increases production by repressurizing the reservoir. In either the high pressure or low pressure scenario, spontaneous combustion of the oil with the oxygen is expected to create a front of combustion gasses which will improve the mobility and accelerate the recovery of the remaining oil. In comparison to CO2 injection, this process will be less costly and will allow increased applicability of tertiary process in areas which CO2 supplies are not available. Louisiana State University (LSU) will conduct additional studies on the project and will have responsibility for a substantial share of the technology transfer activities.

PROJECT STATUS:

Current Work: As a result of air injection, reservoir pressure increases have been seen in each of the target reservoirs. While the initial project design focused on high pressure reservoirs on the west flank, the project was expanded to low pressure reservoirs on the north flank of the field in July 1996. The west flank has yet to see production response; recent data suggests that the limited injection on the north flank is yielding significant increased production. Air injection is continuing in the high pressure reservoirs on the west flank and the low pressure reservoirs on the north flank.

Scheduled Milestones:

Increase in oil production (3rd reservoir - north flank)	07/98
1998 Annual Technical Report	01/99

Accomplishments: First economically viable EOR process which utilizes air injection in low pressure reservoirs. Evidence of in situ combustion and increased reservoir pressure in both high pressure and low pressure reservoirs by 1997-8. In July of 1997, air injection in the low pressure Cam C reservoir on the North Flank of the field was interrupted when the injection well became plugged with iron oxide. As of November 1998, air injection had increased oil production in the North Flank Cam C by 300 BOPD greater than the expected decline. By August 1998 over 165,000 barrels of incremental oil have been produced from the North Flank with an estimated 3 million barrels of incremental production expected from this project over the next twenty years. Air injection rates in the SL 42 No. 155 have averaged only 400 to 500 thousand standard cubic feet per day (MSCFD) due to iron oxide plugging the wellhead filter. To increase injection rates, facilities modifications are being implemented which are expected to relieve the plugging problem. One additional injector, the SL 42 No. 221, was added to the Cam C Reservoir during the fourth quarter of 1998 to increase injection rates and to provide a backup injector for the reservoir. Air injection began in the North Flank Cam D in December of 1997. The Cam D has one injector and two producers. The Cam D is by far the largest of the three low pressure North Flank reservoirs and thereby contains the most reserves. As of November 1998, air injection had increased production by 40 BOPD over the established decline. As a result of recent success in the low pressure reservoirs, two operators are looking at the process in their fields. New economically viable EOR process which utilizes air injection in low pressure reservoirs.